PATENT SPECIFICATION 997,283

DRAWINGS ATTACHED.

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COMPLETE SPECIFICATION.

Method for Obtaining High Quality Briquettes from Iron-Containing Dusts.

We, YAWATA IRON & STEEL COMPANY, LIMITED, a Japanese Company of No. 1, 1-chome, Marunouchi, Chiyoda-ku, Tokyo, Japan, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a method of obtaining high quality briquettes as material for iron production by treating a mixture of blast furnace dust and open hearth furnace flue dust.

The blast furnace dust produced in the operation of a blast furnace today contains 30 to 40% iron, 20 to 30% carbon, 1 to 2% lead and 1 to 5% zinc. The open hearth furnace flue dust produced in the operation of an open hearth furnace contains 55 to 65% iron, 1 to 5% lead and 5 to 10% zinc. Therefore, as they are, the former is too low in iron content and the latter is too high in lead and zinc content to be adapted as raw materials for making iron. Blast furnace dry recovered dust has been magnetically dressed and the dressed iron reused as briquettes or mixed in a raw material and sintered as it is. However, as the lead and zinc contained in the dust are present in both magnetic and non-magnetic particles of the dust, it is difficult to separate lead and zinc by magnetic dressing.

Further, even if such dust is sintered, as the sintering process is in an oxidizing atmosphere, lead and zinc will not separate but will remain in the treated ores.

The open hearth furnace flue dust is a fine powder and contains so much water, lead and zinc that it is not used at all.

An object of the present invention is to solve these problems so that the blast furnace dust and open hearth furnace flue dust may be effectively utilized.

A principle object of the present invention is to provide a method of obtaining high quality briquettes as material for iron production by mixing a blast furnace dust and an open hearth flue dust together so that the composition may be adjusted and firing.

A further object of the present invention is to provide a method of effectively recovering lead and zinc contained in dusts wherein briquettes are made by mixing a blast furnace dust and an open hearth furnace flue dust together and are roasted.

Other objects of the present invention will be made clear by the following explanation with reference to the accompanying drawings.

Figure 1 is an explanatory view of a briquette molding machine which is an embodiment of the present invention.

Figure 2 is an explanatory view of a briquette firing operation system which is an embodiment of the present invention.

According to the present invention, as described above, briquettes are made by mixing a blast furnace dust and open hearth furnace flue dust and are fired so that lead and zonc contained in the dusts may be separated and recovered and briquettes for use in iron production may be obtained.

First of all, a blast furnace dust and an open hearth furnace flue dust are mixed together so that the content of carbon may be adjusted to be 5 to 15%. Briquettes are molded to be of a size of between 10 to 50 mm. diameter. With less than 5% C, the reducing ability will be low and, with more than 15% C, the raw briquettes will be likely to melt when fired.

As the blast furnace dust contains 20 to 30% C as described above, the open hearth

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furnace dust which has lower carbon content is admixed therewith to regulate carbon content of the mixture.

Raw briquettes are molded from the mixed dusts whose carbon content has been adjusted to be of a diameter of 10 to 50 mm. by means of double-wheel type press rollers. It is preferable that such raw briquettes should be of a porosity of more than 20%. It is possible to mold a mixed raw material containing 20% water by means of double-wheel type press rollers.

The above mentioned briquettes are then fired at 1,000 to 1,250° C. The firing will progress naturally due to the carbon content. The lead and zinc will be gasified and separated by the reducing atmosphere. When the porosity is made more than 20%, the aeration will be so high that, even if the briquettes are fired by being directly ignited without being dried and preheated, they will not become powdery and the lead and zinc will be quickly removed. If the firing temperature is below 1,000° C., the zinc will not be properly reduced and removed. Above 1,250° C., the zinc will melt.

The Zn and Pb gasified and separated in the above described process will become powdery oxides by contact with air and will be easily recovered.

In comparing the present invention with the pellet method for example, it is found that, in the pellet method, unless water is removed to be about 10% molding is impossible and, even if water is removed to be 10% and the molding and firing are carried out the material will be powdery unless it is well dried and preheated.

As described above, the advantageous effects of using the present invention are that, the dusts can be converted to high quality briquettes for iron production and such detrimental components as lead and zinc can be removed.

An example of the arrangement of the present apparatus will be described in detail with reference to the drawings. Figure 1 shows the operation system of a molding machine wherein 1 is a charging hopper, 2 are molding rolls, 3 is a delivery chute, 11 is raw material and 12 are raw briquettes. Figure 2 is a firing operation system diagram wherein 4 is a firing furnace, 5 is a grate made of iron, 6 is a wind chamber, 7 is an exhaust fan, 8 is a cooler, 9 is a cyclone, 10 is a chimney, 13 represents charged raw briquettes and 14 indicates the direction of gas movement. Both raw materials, (blast furnace dust and open hearth furnace flue dust) are mixed together so that the carbon content is between 5 to 15% are put into the charging hopper and are pressed and molded by means of the molding rolls 2 and the moldings are taken out through the chute 3. The pressing force and the rotating velocity may be selected according to the mixed state of the raw materials so that briquettes of a porosity of more than 20% may be obtained. The raw briquettes are put into the firing furnace 4, air is sucked downward by means of the exhaust fan 7, the surface of the charge is ignited and the firing temperature is adjusted to 1,000 to 1,250° C. As the firing takes place in a reducing atmosphere, the lead and zinc will be gasified and will be contained in the exhaust gas. They will then be brought into contact with air after the wind box 6 and will be converted to powdery oxides which can be recovered in the cyclone 9. As carbon, lead and zinc have been removed, the fired briquettes will be of high quality containing about 60% total Fe.

In the above downward suction has been described. However, upward suction, can be used in substantially the same manner and the same advantageous effect can be obtained by igniting the raw briquettes from the grate surface.

Example:

By mixing 30% blast furnace dust and 70% open hearth furnace flue dust together, raw briquettes of a porosity of 25% having the following composition were made:

Total Fe	C	Zn	Pb	
48.4	10.5	4.08	3.02	%

By firing these briquettes of the following composition were obtained:

Total Fe	C	Zn	Pb	
62.2	0.5	0.55	0.27	%

Therefore, the rates of removing Zn and Pb were 86.5 and 91.5%, respectively.

WHAT WE CLAIM IS:—

1. A method of obtaining high quality briquettes as material for iron production comprising mixing together blast furnace dust and open hearth furnace dusts so that the carbon content of the mixture is between 5 to 15% by weight, pressing and moulding the mixture into briquettes and heating and firing these raw briquettes at 1,000 to 1,250° C.

2. A method according to Claim 1 in which the mixed dusts are moulded into briquettes having a porosity of more than 20%.

3. A method according to Claim 2 in which lead and zinc contained in the dusts and gasified during firing of the briquettes are converted to powdery oxides by contact with air and recovered as such.

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1 SHEET

FIG. 1

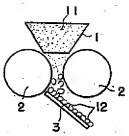

FIG. 2